I claim:

1. A method of sorting a molecule or subpopulation of molecules in a population of molecules, the method comprising the steps of:

(a) attaching an oligonucleotide tag from a repertoire of tags to each molecule in a population of molecules (i) such that the same molecules or same subpopulation of molecules in the population have the same oligonucleotide tag attached and different molecules or different subpopulations of molecules in the population have different oligonucleotide tags attached and (ii) such that each oligonucleotide tag from the repertoire comprises a plurality of subunits and each subunit of the plurality consists of an oligonucleotide having a length from three to six nucleotides or from three to six basepairs, the subunits being selected from a minimally cross-hybridizing set; and

(b) sorting the molecules or subpopulations of molecules of the population by specifically hybridizing the oligonucleotide tags with their respective complements.

2. The method of claim 1 wherein said molecule or said subpopulation of molecules is a polynucleotide or a subpopulation of polynucleotides.

3. The method of claim 2 wherein said complements of said oligonucleotide tags are attached to a solid phase support.

4. The method of claim 3 wherein said solid phase support is a microparticle and only a single kind of said complement is attached to the microparticle.

5. The method of claim 4 wherein said microparticle is selected from the group consisting of glass microparticles, magnetic beads, and polystyrene microparticles.

6. The method of claim 3 wherein said solid phase support is a planar substrate having a plurality of discrete non-overlapping surface regions that have attached therein uniform populations of said complements of said oligonucleotide tags.

7. The method of claim 6 wherein different discrete non-overlapping surface regions of said plurality have attached therein said uniform populations of different kinds of said complements.

8. The method of claim 7 wherein said planar substrate is glass.

9. The method of claim 7 wherein said planar substrate is silicon.

10. The method of claim 7 wherein said planar substrate is plastic.

11. A method of DNA sequencing a target polynucleotide, the method comprising the steps of:

generating a plurality of randomly overlapping fragments from the target polynucleotide;

attaching an oligonucleotide tag from a repertoire of tags to each randomly overlapping fragment of the plurality (i) such that the same randomly overlapping fragments have the same oligonucleotide tag attached and different randomly overlapping fragments have different oligonucleotide tags attached and (ii) such that each oligonucleotide tag from the repertoire comprises a plurality of subunits and each subunit of the plurality consists of an oligonucleotide having a length from three to six nucleotides or from three to six basepairs, the subunits being selected from a minimally cross-hybridizing set;

sorting the randomly overlapping fragments by specifically hybridizing the oligonucleotide tags with their respective complements;

determining the nucleotide sequence of a portion of each of the randomly overlapping fragments of the plurality; and

determining the nucleotide sequence of the target polynucleotide by collating the sequences of the randomly overlapping fragments.

12. The method of claim 11 wherein said complements of said oligonucleotide tags are attached to a solid phase support.

13. The method of claim 12 wherein said step of determining said nucleotide sequence of said randomly overlapping fragment is carried out

simultaneously for said plurality of randomly overlapping fragments by a single base sequencing method.